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OF

Richard Hai Huang

FOR

MULTI-FUNCTIONAL MORTISE LOCK

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Name: Marian R. Capelli

Signature: Marian R. Capelli

MULTI-FUNCTIONAL MORTISE LOCK

Background Of The Invention

1. Field of the Invention

This invention relates to mortise locks with multiple functions in which the
5 functions can be changed without opening the case.

2. Description of Related Art

Mortise locks need to provide a variety of functions. For example, in some
installations it is desirable to disable rotation of the outside handle while allowing
the inside handle to operate normally. In other applications, it is desirable to
10 disable permanent unlocking of the handles with the key, or to disable retraction of
the latch with the key. Making these changes to the normal operation of the
mortise lock has previously required partially or totally disassembling the mortise
lock and rearranging or configuring the mortise lock components to achieve the
desired mode of operation.

15 Although such changes can be made reliably by trained personnel at the
factory, the task of disassembling the mortise lock is still a relatively time
consuming process. Moreover disassembling the mortise lock provides
opportunities for damaging the components. Additionally, components may
become lost during the adjustment process. These problems are accentuated when
20 the changes need to be made in the field by installers or maintenance personnel.

A related problem is that there are often many different functions that can be
provided. These functions are typically identified by a code or function number.
However, once the mortise lock case has been opened, the installer must reference
one or more drawings by function number to determine the correct internal change
25 or changes to be made. There are many opportunities to make a mistake in this
process.

After internal changes have been made, the reassembled mortise lock may
appear identical to the original unmodified lock. This causes problems with
identifying the modified locks when multiple mortise locks are being changed or
30 installed with different functions.

When changes are to be made to a mortise lock, modified components may be necessary. This causes difficulties if the modified components are not readily available in the field. Conversely, when a previously modified lock is to be changed to the original functionality, any previously removed components must be replaced. This is a concern because the original components are often no longer with the lock and may have become lost.

To avoid the difficulties described above, most mortise lock manufacturers modify the locks only at the factory, and do not recommend or support modifications made in the field. This policy, however, requires that the manufacturer and its distributors stock mortise locks for all the different functions offered even though the locks are substantially similar in most respects. Stocking multiple mortise locks is expensive, particularly for the less common mortise lock functions. To reduce inventory costs, some locks that provide less common functions may not be stocked by distributors, resulting in ordering delays.

Bearing in mind the problems and deficiencies of the prior art, it is therefore an object of the present invention to provide a multi-functional mortise lock in which the housing does not have to be opened in order to change lock functionality.

It is another object of the present invention to provide a multi-functional mortise lock in which multiple functions are marked on the exterior of the mortise lock adjacent to critical locations where changes are made to identify the functions performed by the lock once the changes have been made.

It is a further object of the present invention to provide a multi-functional mortise lock in which the functions performed by a modified mortise lock may be readily determined from the exterior of the mortise lock without opening the mortise lock case.

A further object of the present invention is to provide a multi-functional mortise lock in which the components required to modify the lock and to change the lock back to original functionality are kept with the lock in externally accessible locations.

Another object of the present invention is to provide a multi-functional mortise lock that can easily be changed between different functions by untrained personnel to reduce the number of different types of mortise locks providing different functions that would otherwise have to be stocked in a distribution chain.

5 Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

Summary of the Invention

The above and other objects, which will be apparent to those skilled in art, are achieved in the present invention which is directed to a multi-functional mortise
10 lock having a casing that includes a front plate, a first sidewall and an opposed second sidewall. A latch bolt extends through the front plate and is movable with respect to the casing between an extended position and a retracted position. At least one spindle hub adapted for connection to a spindle projecting from a handle is installed in the mortise lock casing. The spindle hub moves the latch bolt to the
15 retracted position when it is rotated.

The mortise lock also includes a latch retract lever, a control hub, an interfering member and a lock/unlock lever. The control hub is operably connected to move the latch retract lever, which, in turn, retracts the latch bolt. The control hub is also operably connected to move the lock/unlock lever, which, in turn,
20 moves the interfering member to lock and unlock the spindle hub.

The operation of the spindle hub, the latch retract lever and the lock/unlock lever may all be modified in the preferred embodiment of the invention by installing blocking elements. The preferred embodiment allows the installation of three blocking elements corresponding to the spindle hub, the latch retract lever
25 and the lock/unlock lever. The blocking elements may be installed individually or in combinations to achieve various functions.

A latch retract blocking element is optionally positionable to block motion of the latch retract lever. With the latch retract blocking element installed, the latch retract lever cannot be moved by the control hub to retract the latch bolt. The latch

retract blocking element is preferably a screw that is installed from the exterior of the casing without removing a sidewall.

5 A lock/unlock blocking element is optionally positionable to block the lock/unlock lever. This prevents the control hub from moving the lock/unlock lever between the locked and unlocked positions. Again, the lock/unlock blocking element is preferably a screw that is installed from the exterior of the casing without removing a sidewall.

10 A spindle hub blocking element is optionally positionable to block the spindle hub and prevent rotation thereof. Blocking the spindle hub prevents a handle attached to that hub from retracting the latch bolt. The spindle hub blocking element is also preferably a screw that is installed from the exterior of the casing without removing a sidewall or otherwise opening the casing.

15 The blocking elements are installed in threaded blocking openings in a sidewall of the mortise lock casing such that the head of the screw remains outside the sidewall and the end of the screw extends into the casing to block motion of its associated component.

20 In the most highly preferred embodiment of the invention, the exterior of the sidewall is marked to identify the functions performed by the blocking elements. Storage locations are provided for the screws forming the blocking elements to ensure that they are readily available.

Brief Description of the Drawings

25 The features of the invention believed to be novel and the elements characteristic of the invention are set forth with particularity in the appended claims. The figures are for illustration purposes only and are not drawn to scale. The invention itself, however, both as to organization and method of operation, may best be understood by reference to the detailed description which follows taken in conjunction with the accompanying drawings in which:

30 Fig. 1 is a side elevational view of a multi-functional mortise lock according to the present invention. The sidewall has been removed to expose the internal components of the mortise lock.

Fig. 2 is a side elevational view of the multi-functional mortise lock in Fig. 1 taken from the opposite side of Fig. 1. Fig. 2 shows function markings on the exterior of the mortise lock case sidewall.

Fig. 3 is a perspective view of the multi-functional mortise lock in Fig. 1.

5 The sidewall has been removed to expose the internal components of the mortise lock.

Fig. 4 is a perspective view of the multi-functional mortise lock in Fig. 1 and substantially corresponds to Fig. 3 except it includes three detail views A-C at an enlarged scale to illustrate the location of three corresponding blocking elements and their relationship to and interaction with moving components of the mortise lock.

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Description of the Preferred Embodiment(s)

In describing the preferred embodiment of the present invention, reference will be made herein to Figs. 1-4 of the drawings in which like numerals refer to like features of the invention.

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Referring to Fig. 1, the present invention comprises a mortise lock 10 having a casing 20 formed by a top wall 22, a back wall 24, a bottom wall 26, a front plate 28 and a pair of sidewalls 30. One sidewall is shown in the drawings. The opposite sidewall has been removed to show the internal components of the mortise lock and their relative positions and operation.

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Principal components inside the mortise lock include a control hub 32, a pair of spindle hubs 34, 36 (see Fig. 3), a latch bolt 42 having a latch bolt tail 40, an interfering member 44, a lock/unlock lever 52 and a latch retract lever 62.

The spindle hubs 34, 36 can be rotated independently by inner and outer handles having spindles (not shown) that engage corresponding spindle openings 38 in each spindle hub. When a handle is rotated, its corresponding spindle rotates the associated spindle hub, which drives the latch bolt tail 40 and retracts the latch bolt 42.

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The interfering member 44 slides towards and away from the front plate 28 between unlocked and locked positions to unlock and lock at least one of the

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spindle hubs 34, 36. When the interfering member slides away from the front plate 28, as shown in Fig. 1, it moves to the locked position and engages a notch 46 in at least one of the spindle hubs 34, 36. The engagement between notch 46 and the interfering member prevents the spindle hub with the notch from turning.

5 A rotatable element 48 is located on the end of interfering member 44. The rotatable element 48 turns on a shaft 50 and is shaped so that it can engage either one of the spindle hubs or both of the spindle hubs when the interfering member is in the locked position. The rotatable element 48 may be manually turned to the desired position when both of the sidewalls are installed to alter the function of the
10 interfering member. When the interfering member slides towards the front plate 28, it is in the unlocked position and both spindle hubs are free to turn.

Lock/unlock lever 52 extends between the control hub 32 and the interfering member 44 and pivots on pivot 54 located between the control hub 32 and the interfering member 44. The lock/unlock lever 52 moves the interfering member 44
15 between the locked and unlocked positions under the influence of control hub 32. Pivot 54 causes the lock/unlock lever 52 to slide the interfering member 44 to the unlocked position when the control hub 32 is rotated counter clockwise in Fig. 1. The pivot for the lock/unlock lever is located behind spring 56.

Control hub 32 may be rotated by thumb latch engaging slot 58 on the axis
20 of rotation of the control hub 32 or it may be rotated by a conventional lock cylinder (not shown) located in lock cylinder opening 60. A projection from the lock cylinder (not shown) contacts the control hub to rotate it when a key is inserted and rotated in the lock cylinder. When the control hub 32 is rotated in the clockwise direction, it drives latch retract lever 62 to retract the latch bolt 42.

25 One end of the latch retract lever 62 pivots on pivot 64. The opposite end of the latch retract lever contacts the tail 40 of the latch bolt 42. Clockwise rotation of the control hub 32 pivots the latch retract lever 62 on pivot 64 and retracts the latch bolt 42. This allows the latch to be retracted by either the thumb latch, which directly drives the control hub at thumb latch engaging slot 58 or with a key
30 inserted into a lock cylinder installed in lock cylinder opening 60.

The components and their relative operation described above are all substantially similar to known mortise lock components used in the prior art as exemplified by mortise locks sold by Sargent Manufacturing Company of New Haven Connecticut. Similar components may be seen in United States Patent No. 5,678,870, particularly including the operation of the latch bolt, the interfering member and the spindle hubs.

In order to implement certain desirable functions in mortise locks of the type described above, it has heretofore been necessary to remove one of the sidewalls and remove, replace, or modify one or more internal components. In the present invention, as more fully described below, it is not necessary to remove a sidewall to achieve these desired functions.

Referring to Fig. 2, sidewall 30 is provided with threaded blocking openings 72, 74, 76 that receive corresponding screws 78, 80 located in threaded storage openings 82, 84. When the screws 78, 80 are in the storage locations 82, 84, as illustrated in Fig. 2, the screws 78, 80 perform no function and the moving components, including the latch retract lever 62, the lock/unlock lever 52 and the spindle hub 36 operate as previously described.

However, by moving the screws 78, 80 from the storage location 82, 84 to one or more of the threaded blocking openings 72, 74 or 76, the operation of these components (latch retract lever, lock/unlock lever and spindle hub) may be blocked. When installed at one of the threaded blocking openings, the screws 78, 80 operate as corresponding "blocking elements" to block prevent certain motions of the associated lever or hub.

Fig.4 illustrates the function of the three blocking elements when installed in blocking openings 72, 74, 76 by providing three corresponding detail views "A," "B" and "C" connected by arrows pointing to the associated blocking opening in sidewall 30. When a screw 78, 80 is moved to a threaded blocking opening 72, 74 or 76, the end of the screw projects into the mortise lock through sidewall 30 and interferes with or blocks its associated hub or lever. The end of the screw is

referred to as a “blocking element” and is identified by a new reference number below to identify its function.

Referring to detail view “A” in Fig. 4, the latch retract blocking element 86 projects through blocking opening 72 and prevents the latch retract lever 62 from pivoting about pivot point 64 to retract the latch bolt 42. The control hub 32 can no longer be used to retract the latch bolt 42 with the latch retract blocking element 86 installed. It should be understood that the latch retract blocking element 86 may be formed by either of the blocking screws 78 or 80. The blocking screw may be easily installed or removed and placed back into storage without the necessity for removing the sidewall 30.

As can be seen in Fig. 2, markings are provided on the sidewall 30 at 88, 90, 92 and 94 to indicate the functions that the mortise lock will perform when screws are installed in the corresponding locations. Function numbers are used to identify the functions. Function numbers at 88 indicate conventional functions that may be performed when the latch retract lever, lock/unlock lever and spindle hub are free to operate normally. Functions “36” and “87” marked at 90 correspond to the disabling of the latch retract lever 62 by blocking element 86 installed in opening 72 as described above.

Referring to detail view “B” of Fig. 4, it can be seen that installing a blocking screw in blocking opening 74 forms a lock/unlock blocking element 96. With the lock/unlock blocking element 96 installed, the lock/unlock lever 52 can no longer pivot about pivot 54. This prevents the lock/unlock lever 52 from moving the interfering member 44 to the unlocked position (towards the front plate 28 and out of interfering engagement with one or both of the controlled hubs 34, 36).

Referring to detail view “C” of Fig. 4, installing a blocking screw in opening 76 forms a spindle hub blocking element 98 which prevents the spindle hub 36 from being turned by a handle to retract the latch bolt 42 via latch bolt tail 40. The blocking element 98 interferes only with one of the two spindle hubs.

Although the functions of the blocking elements have been individually described above, more than one blocking screw may be installed at a time to

perform combined functions. In the preferred design, as may be seen in Fig. 2, the functions provided by various combinations of installed screws is marked on the exterior of the sidewall adjacent to the corresponding blocking opening. Thus, function number "17" corresponds to blocking the lock/unlock lever by installing a screw in opening 74 and blocking the spindle hub by installing a screw in opening 76. Function number "13" corresponds to blocking the lock/unlock lever by installing a screw in opening 74 and blocking the latch retract lever by installing a screw in opening 72.

It will be noted that all of the blocking screws may be installed from a single side of the mortise lock and that only that side needs to be marked with applicable function numbers. The functions performed by the lock may be readily determined by noting which screws are installed and referencing the marked function numbers adjacent thereto. The storage locations for unused blocking screws ensure that the required blocking elements are readily available at the time of initial installation and long after.

While the present invention has been particularly described in conjunction with a specific preferred embodiment, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art in light of the foregoing description. It is therefore contemplated that the appended claims will embrace any such alternatives, modifications and variations as falling within the true scope and spirit of the present invention.

Thus, having described the invention, what is claimed is: